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Analysis of Project-Based Learning Design Needs: Building Students' Creative Thinking Skills and Independent Learning

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A B S T R A C T

The ability to think creatively and learn independently is an important factor in student success in the learning process. One model that plays an important role in increasing creative thinking and independent learning is the project based learning (PjBL) model. This research aims to analyze the needs for project-based learning design to improve creative thinking abilities and learning independence. The research was conducted at a high school in Pekanbaru involving 76 students. Data collection methods use closed and open questionnaires. The research results show that project model learning is a model that many students are interested in. In the open-ended question, most students were interested in PjBL learning, which was 25 people. In the open-ended question, 64.5% agreed that the physics project helped them disseminate their understanding. Apart from that, students' creative thinking abilities and learning independence are not yet optimal, so it is necessary to design a learning model that is popular and can improve students' creative thinking abilities and learning independence.

1. Introduction

In the world of modern education, student creativity and independent learning are increasingly emphasized aspects (Tsvetkova et al., 2021). Technological advances and rapid social change require students not only to have a strong conceptual understanding, but also to be able to think creatively and independently in solving problems (Dewi & Primayana, 2019; Puspitasari et al., 2018). 21st century education demands the development of higher order thinking skills including analysis, synthesis, and evaluation (Miterianifa et al., 2021), this means that it is not enough if it is only obtained through conventional learning methods based on lectures or rote memorization. Therefore, more active learning approaches such as project-based learning are increasingly receiving attention as strategies that can encourage students' creativity and independent learning.

Even though the importance of creativity and independent learning has been widely recognized, the reality on the ground shows that these two aspects are still big challenges in the education system. Many students are still accustomed to passive learning patterns, where they wait more for teacher instructions without doing much independent exploration (Bell, 2020; Sulistyo, 2021). As a result, many students have difficulty developing new ideas (Salay, 2019) and complete tasks independently (Arlina Arlina et al., 2023; Nugraha et al., 2023; Rani, 2021), students may not feel actively involved in learning (Andajani, 2022; Kasi, 2022; Ritonga & Napitupulu, 2024), learning becomes less meaningful for them (Ameliana, 2017; Anggianita et al., 2020).

In addition, research shows that there are low levels of creativity. This is proven by several studies which state that students' creative thinking skills are still low (Amaliyah et al., 2023; B. Molina et al., 2021; Musdi et al., 2024; Purwati & Alberida, 2022; Sumarni & Kadarwati, 2020). This occurs due to teaching methods that do not involve students actively in the learning process. Learning is more teacher-centered which tends to inhibit students from thinking critically and creatively (Hairunisa, 2023; Purwasila et al., 2024). Likewise, there is low learning independence, which often arises from a lack of opportunities for students to take initiative and manage their own learning.

One solution that can be applied to overcome this problem is the application of project-based learning. This method focuses on giving assignments in the form of projects that challenge students to solve real problems independently or in groups (Yuniarti, 2021). In this process, students not only learn to understand academic concepts but also develop creative, collaborative and problem solving thinking skills. PjBL provides opportunities for students to explore and develop new ideas more freely (Artama et al., 2023; Diyah et al., 2023; Zainuddin et al., 2023), because students are given the freedom to determine the best approach and solution in completing the project. Apart from that, this method also requires students to be more responsible for their own learning process, thereby increasing learning independence. Thus, project-based learning can be an effective alternative in fostering student creativity and independence.

Implementing project-based learning has various benefits for students, teachers, and the education system as a whole. Some of the main benefits of project-based learning are that it can improve students' creative thinking skills (Fadhil et al., 2021), foster learning independence (Santyasa et al., 2020), develop collaborative skills (Almulla, 2020; Yustina et al., 2020), increase learning motivation (Wu & Wu, 2020), and improve critical thinking skills (Situmorang et al., 2022). There are many benefits felt in implementing project-based learning, however the implementation of project-based learning is still rarely implemented in schools. Based on the results of interviews that have been conducted, it is known that learning in schools is generally still conventional-based, resulting in a lack of student skills.

Learning physics is often considered difficult because it has a complex process, so many students are less interested in learning the basic principles and concepts.

Learning approaches that are too teacher-centered are no longer effective in helping students understand physics concepts and improving the quality of their learning. Therefore, learning methods are needed that encourage students to play an active role and interact with the surrounding environment. This can be achieved through discussions, experiments and exploratory observations outside the classroom, so that the learning experience becomes more meaningful and not just limited to theory.

Based on the background description above, researchers are interested in analyzing the need for project-based learning in improving students' creative thinking skills and learning independence. With this designed analysis, it is hoped that it can map students' needs in the process of teaching and learning activities.

2. Methodology

This research analysis was carried out at SMAN 8 Pekanbaru, Riau. The number of survey respondents was 76 students. The research was conducted in November 2024. The type of research carried out was survey research. Data collection methods use closed and open questionnaires. The research process flow can be seen in Figure 1 below:

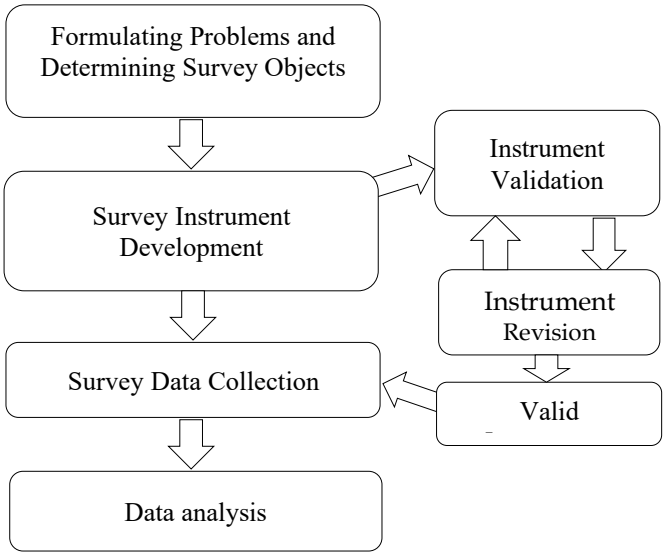

Figure 1. Flowchart of Project-based learning Needs Analysis Adaptation (Febrian et al., 2021)

The research instrument used is a questionnaire compiled based on the needs analysis indicators. The questionnaire consists of question items from 3 indicators (closed questions) and 2 indicators (open questions). The question items consist of 4 answer choices, namely strongly agree with a value of 4, agree with a value of 3, disagree with a value of 2, and strongly disagree with a value of 1. Before the questionnaire is distributed, the questionnaire will be validated by an expert validator to assess the feasibility of the instrument.

3. Result and Discussion

According to Gall et al., (2019) needs analysis is a systematic process to identify gaps between current and desired conditions, and determine the needs that must be met to achieve certain goals. This analysis is often used in educational planning, curriculum development, instructional design, and research to understand the needs of users or learners. This research is also expected to be the first step in the solution of learning innovations that integrate projects in education.

With this project-based learning, students are encouraged to think out-of-the-box and develop innovative solutions to the problems they face. In PjBL, students are responsible for their own learning process, from planning to implementing the project. This helps students develop self-management and initiative skills, which are essential for lifelong learning. In addition, PjBL allows students to identify their own learning needs and seek out the resources needed to achieve the project goals.

In the needs analysis that is used as the subject of research according to Dudley-Evans and St. John in Rahman, (2015) states that there are three concepts of needs analysis, namely: (1) understanding the circumstances and characteristics of students, (2) determining the most effective learning strategies according to certain conditions and groups, and (3) analyzing the target situation and environment so that data can be interpreted accurately. Therefore, aspects related to students, such as interests, talents, and backgrounds, need to be considered in the process of identifying or analyzing these needs. The following is a table listing the questions given to students.

Table 1. Questionnaire Conditions and Situations of Learning Methods and Models in Schools

No	Aspect	Indicator	Statement
1	The need for project-based learning models	Effectiveness	The learning model currently applied by teachers is not effective in improving my understanding of the material.
2		Student Engagement	The teaching methods currently used cannot encourage my active participation in learning.
3		Preferred learning model	I enjoy challenging, project-based learning.
4			I can identify my strengths and weaknesses through physics projects.
5		Reflection	Physics projects help me evaluate my understanding of physics concepts.
6			The final product of the physics project reflects my understanding of the concepts learned.

The table of questions is to identify how learning is currently going on in schools. From these questions, researchers can find out the methods and learning models that are often used by teachers in schools. Furthermore, researchers also want to see how independent students are in learning, here is a list of questions about student learning independence.

Table 2. Student Learning Independence Level Questionnaire

No	Aspect	Indicator	Statement
1	Learning Independence	Not Dependent on Others	I try to find my own solutions when facing problems in studying physics material.
2		Have Self Confidence	I dare to express my opinion in physics group discussions
3		Behave Disciplinedly	I created a personal study schedule at home to review and complete physics assignments on time.
4		Behave Based on Your Own Initiative	I took the initiative to look for other references to support my understanding of physics material.
5		Have Self Control	I refused my friend's invitation to play while studying physics.

The table of questions above identifies the level of student learning independence. This needs to be known by researchers in improving learning in schools. In addition, researchers also identify the level of creative thinking of students, the following is a table of questions related to students' creative thinking skills.

Table 3. Students' Creative Thinking Ability Questionnaire

No	Aspect	Indicator	Statement
1	Creative Thinking	Fluency:	I can easily think of ways to apply physics concepts such as kinetic energy in everyday life.
2			When asked, I can quickly suggest several different methods for measuring physical quantities such as gravitational acceleration.
3		Flexibility	I can think of alternative solutions when standard approaches do not work in solving physics problems.
4		Originality (Authenticity)	I am able to propose unusual experimental designs to test hypotheses in physics.
5			I can create creative analogies to explain complex physics concepts.
6		Elaboration (Elaboration)	I can explain physics concepts in detail using various examples and illustrations.
7			

The table of questions above is used to determine the level of creative thinking of students. In addition to using closed questions, researchers also use open questions related to needs analysis in learning. The following are questions related to needs analysis in learning.

Table 4. Open Questions

Number	Question
1	What learning method do you want?
2	Can the project method create enthusiasm and motivation in learning?

Analyze open questions

Data obtained through the distribution of open-ended questionnaires to students with a total of 76 respondents produced several crucial pieces of information as follows:

The learning method that students want

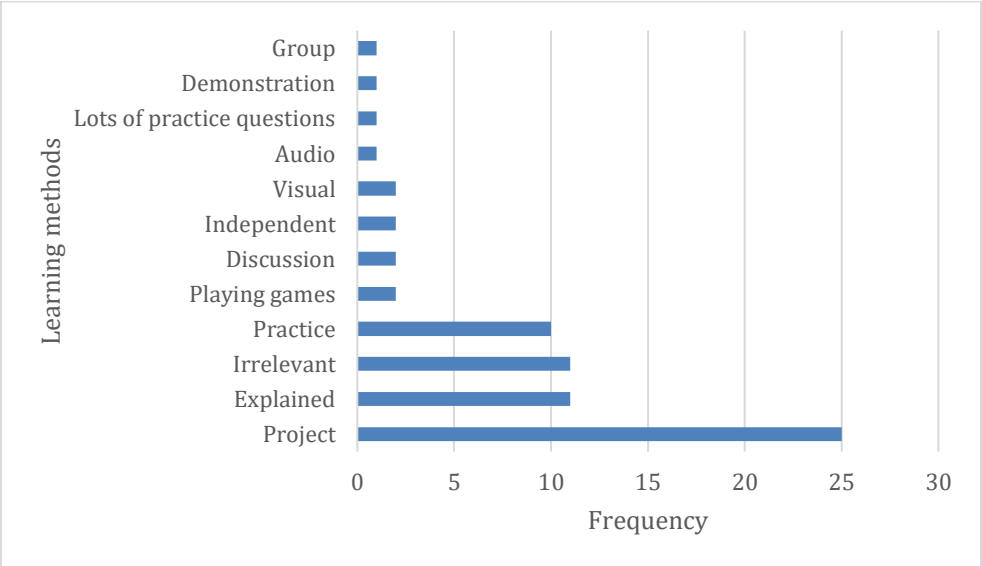

Figure 2. Graph of learning methods desired by students

The graph above shows that students want varied learning, where project-based learning is the most, namely 25 people. Project-Based Learning is an approach that involves students in completing real projects to improve their understanding and skills. This method emphasizes the process of exploration, research, and collaboration in finding solutions to problems given (Septianingsih et al., 2024). Compared to conventional learning, PjBL provides a more in-depth learning experience because students not only receive theory but also apply it in real-world situations. In addition, PjBL helps develop critical thinking skills, creativity, and learning independence. In PjBL, students are encouraged to take responsibility for their own learning, so they are more active in exploring various sources of information. Therefore, the application of PjBL in education is very important to

equip students with 21st-century competencies needed in the world of work and everyday life.

The project method can foster enthusiasm and motivation in learning

Project-based learning models can foster students' enthusiasm and motivation in learning because they actively involve completing real tasks. The following graph shows the results of students' enthusiasm levels through project-based learning.

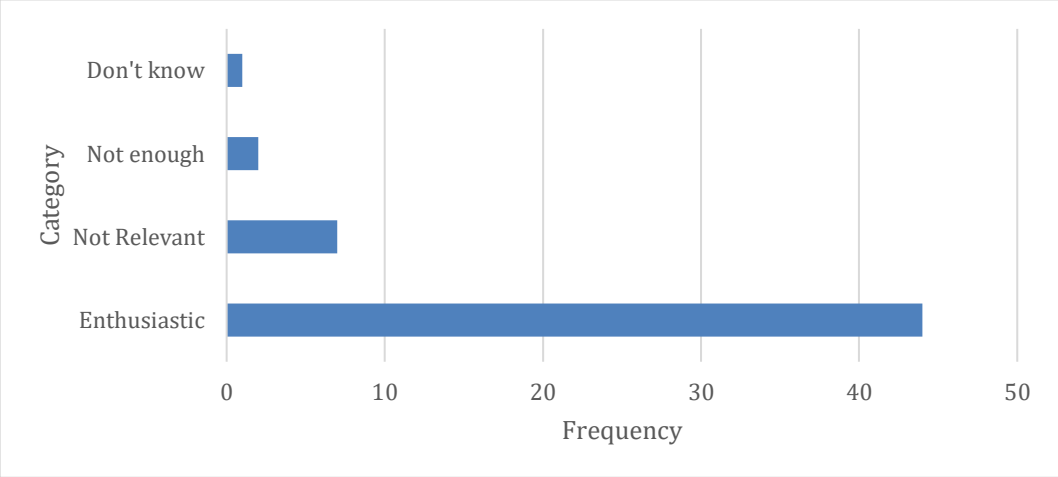

Figure 3. Graph of the impact of PjBL on motivation and enthusiasm for learning

From the graph above we can see that students have a high level of enthusiasm with project-based learning. In other words, project-based learning provides enthusiasm and motivation for students in learning physics.

Closed Question Analysis

Learning Methods and Models

The results of the questions regarding the effectiveness of learning with the model that has been implemented and the alternative learning with the project model are as follows: As many as 32.9% of students strongly agreed and 60.5% agreed that the applied model was not yet effective. This is an indication that the implementation of the learning model used by teachers is currently still not optimal. The ineffectiveness of the applied learning model is because the learning model used is still conventional. Conventional learning models are still widely used in the world of education, especially in the form of lectures or expository which places the teacher as the main center of learning. Although this method has advantages in delivering systematic information, there are various negative impacts that need to be considered. One of the main impacts is the lack of active involvement of students in the learning process. In learning, conventional students tend to only listen and take notes without much opportunity to discuss or explore the material independently, can be seen in Figure 4.

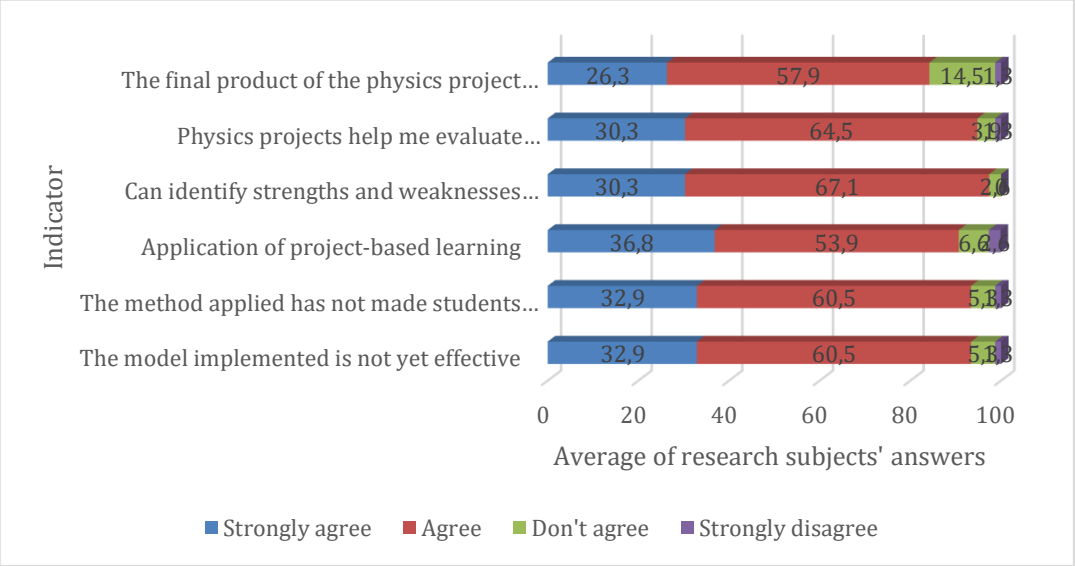

Figure 4. Results of The Questionnaire Regarding The Effectiveness of Learning Methods and Models

This can hinder the development of critical thinking and problem-solving skills that are very much needed in real life (Sucipta et al., 2023). In addition, this learning model often does not pay attention to differences in student learning styles. Students who have a visual or kinesthetic learning style may have difficulty understanding material if it is only delivered through lectures. As a result, understanding of concepts becomes shallow and easily forgotten. Another impact is the low motivation of students to learn because learning is monotonous and less interesting (Susanti et al., 2024). Students tend to be passive and only focus on the end result, such as exam scores, without really understanding the essence of the material being studied. In the long term, the use of dominant conventional learning models can hinder the development of 21st century skills, such as cooperation, communication, and creativity (Maysuri & Sopacua, 2024). Therefore, it is important for educators to combine other, more innovative learning methods, such as project-based or inquiry-based learning, to increase learning effectiveness and encourage active engagement.

In addition to the less effective learning model, it turns out that the methods applied have not been able to make students active in class, where 32.9% of students strongly agree and 60.5% agree that the methods applied have not fully made them active. Activeness in learning also contributes to the development of social and communication skills. When students are involved in discussions and group work, they learn to express opinions, listen to other perspectives, and collaborate in completing tasks. This is very important in facing the challenges of the world of work that demands good communication and teamwork skills (Morrison-Smith & Ruiz, 2020;Rofiudin et al., 2024).

As many as 36.8% of students strongly agree and 53.9% agree that the implementation of project-based learning is going well. Project-based learning is a learning model that involves students in in-depth exploration of a topic through

real projects (Belwal et al., 2020). In this model, students play an active role in designing, developing, and completing projects related to the subject matter (Morrison et al., 2021). In addition, this method makes learning more meaningful because students directly experience the learning process, not just receiving theory. Therefore, the application of PjBL is very effective in improving students' understanding and learning motivation. Then, as many as 30.3% of students strongly agree and 67.1% agree that they can identify their strengths and weaknesses through physics projects. Based on the problem allows students to reflect on their abilities and understand the concept more deeply. As many as 30.3% of students strongly agree and 64.5% agree that physics projects help them spread understanding. This indicates that this method is quite effective in measuring students' understanding of physics concepts. Evaluation of understanding through projects is in line with the principles of inquiry-based learning that emphasizes active exploration.

The final product of the physics project reflects students' understanding, as many as 26.3 students stated that they strongly agree and 57.9 students stated that they agree, meaning that 84.2% of students stated that the physics project they worked on reflects their understanding of the material. This shows that the final product produced by students can represent their understanding effectively. Project-Based Learning has been proven effective in improving students' understanding. Through PjBL, students are actively involved in the learning process by working on real projects that are relevant to the subject matter. This approach allows students to learn theory with practice, so that understanding of concepts becomes deeper. In addition, PjBL encourages the development of critical thinking skills, problem solving, and collaboration between students. Research shows that the implementation of PjBL significantly improves students' creative thinking skills and conceptual understanding (Emira Hayatina Ramadhan & Hindun Hindun, 2023). In addition, other studies state that project-based learning can increase student motivation and participation (Setyo et al., 2024; Trianasari et al., 2024), critical thinking and problem solving (Anazifa & Djukri, 2017; Issa & Khataibeh, 2021; Karan & Brown, 2022), encourage cooperation and social skills (Lee et al., 2015). Thus, project-based learning is good to be implemented in schools.

Student Learning Independence Level

Learning independence is the ability of students to manage their own learning process without high dependence on teachers or instructors. Students who are independent in learning are able to plan, organize, and initiate their understanding of the material being studied. (Ambiyar et al., 2020). This independence is very important in 21st century learning because it encourages students to actively seek information, think critically, and solve problems independently (Rahim, 2018). The following are the results of a questionnaire regarding student learning independence.

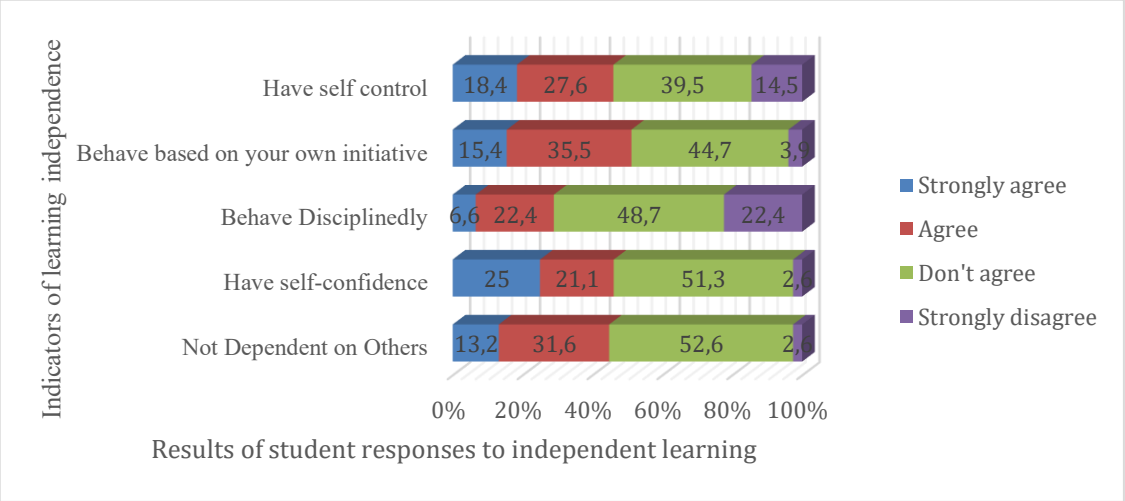

Figure 5. Questionnaire Results Related to Students' Level of Learning Independence

Have Self Control

Self-control is an individual's ability to control emotions, behavior, and desires to stay in line with social norms and personal goals (Harahap, 2017). Based on the graph, most respondents disagree that they have self-control (39.5%) and 14.5% strongly disagree. On the other hand, only 18.4% strongly agree and 27.6% agree. These data indicate that the level of self-control in this population is still relatively low. Weak self-control can have an impact on the inability to measure emotions and make wise decisions in various situations (Rofiqa et al., 2024). Therefore, training and education regarding self-management are needed so that individuals can better control impulsivity and act more rationally in everyday life.

Behaving on One's Own Initiative

Initiative is the ability to act without waiting for instructions or encouragement from others. (Mohamad et al, 2020). Based on the data, 44.7% of respondents disagreed and 3.9% strongly disagreed that they behaved based on their own initiative. Meanwhile, 15.4% strongly agreed and 35.5% agreed. These results indicate that most individuals still rely on external direction in acting. Lack of initiative can be caused by a lack of self-confidence or an environment that does not support individual autonomy (Andriyani, 2020). Improving decision-making skills and providing space for independent action can help increase individual initiative.

Behave Discipline

Discipline refers to consistency in acting in accordance with established rules and norms (Wulandari & Sunarti, 2024). The graph shows that 48.7% of respondents disagree and 22.4% strongly disagree that they have disciplined behavior. Meanwhile, only 6.6% strongly agree and 22.4% agree. This figure shows that disciplined behavior is still a challenge for most respondents. Lack of discipline

can have a negative impact on a person's academic, professional, and personal life achievements. Therefore, there needs to be an improvement in the pattern of coaching and strengthening habits that encourage discipline from an early age.

Have Self-Confidence

Self-confidence is a person's belief in their ability to achieve desired goals (Dewi et al., 2013). From the graph, 51.3% of respondents disagreed that they had self-confidence, while 2.6% strongly disagreed. On the other hand, 25% strongly agreed and 21.1% agreed. This figure shows that many individuals still feel less confident. Factors that influence self-confidence include other experiences in the past, social environment, and the level of support received (Kresna & Rahmasari, 2020). To increase self-confidence, individuals need to be encouraged to try new challenges, acquire new skills, and get support from their surroundings.

Don't Depend on others

Independence is a person's ability to act and make their own decisions without relying too much on other people (Susanti, 2020). From the data, 52.6% of respondents disagreed and 2.6% strongly disagreed that they were not dependent on others. On the other hand, 13.2% strongly agreed and 31.6% agreed. This shows that most individuals still show dependence on others in making decisions or completing tasks. Excessive dependence can hinder personal and professional development. Therefore, an independence program is needed, such as training in decision-making and independent problem solving.

Low learning independence can have a negative impact on students, such as high dependence on teachers, lack of initiative in seeking information, and difficulty in completing tasks independently. As a result, students become passive and less prepared to face academic challenges and the world of work. Therefore, it is important to train learning independence through methods such as project-based learning and inquiry, which encourage students to think critically and take responsibility for their learning process. Thus, students will be better prepared to face various challenges in the future. Then in this study also analyzed students' creative thinking skills, here are the results of the student creative thinking skills questionnaire.

The ability to think creatively in applying physics concepts is very important in problem solving and technological innovation (Mahombar et al., 2023). Based on the graph, most respondents disagree (59.2%) and strongly disagree (11.8%) that they find it easy to think of various ways to apply physics concepts. Meanwhile, only 5.3% strongly agree and 23.7% agree. These data indicate that there are still many individuals who have difficulty in fluency thinking in the context of physics. This could be caused by learning methods that still focus on memorization rather than concept exploration. Therefore, an active experiment-based and problem-solving approach should be applied more often so that students are accustomed to thinking creatively in physics.

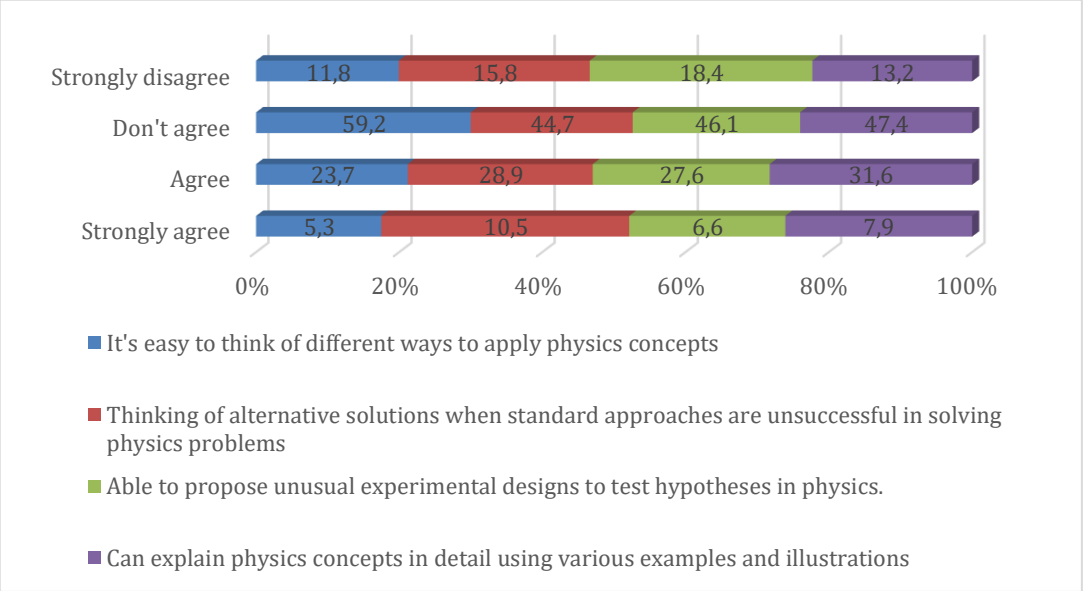

Figure 6. Results of the questionnaire related to students' creative thinking skills

Furthermore, it is very important in solving physics problems, especially when standard approaches do not work. Based on the graph, as many as 44.7% of respondents disagreed and 15.8% strongly disagreed that they were able to think of alternatives in solving physics problems. Meanwhile, 28.9% agreed and 10.5% strongly agreed. These results indicate that there are still many students who are not able to use alternative strategies in solving physics problems. This can be caused by a lack of practice in exploratory problem solving and a lack of in-depth conceptual understanding. To improve this ability, inquiry-based and discussion-based learning methods are needed that encourage students to explore various approaches in solving a physics problem.

Experimental design is an important aspect of the scientific method to test hypotheses and obtain empirical data. From the graph, 46.1% of respondents disagreed and 18.4% strongly disagreed that they were able to modify unconventional experimental designs. Meanwhile, 27.6% agreed and 6.7% strongly agreed. This figure shows that many individuals have difficulty in thinking creatively regarding physics experiments. One of the causes could be the lack of direct experience in conducting experiments or the lack of training in designing independent experiments (Bransford et al., 2000). Therefore, a laboratory-based learning approach with an emphasis on exploratory experiments is essential to enhance these skills.

Conceptual understanding in physics is highly dependent on an individual's ability to explain concepts using examples and illustrations. Based on the data, 47.4% of respondents disagreed and 13.2% strongly disagreed that they were able to explain physics concepts in detail. Conversely, 31.6% agreed and only 7.9% strongly agreed. These results indicate that many individuals still have difficulty articulating physics concepts clearly. Possible contributing factors are a lack of in-depth understanding of basic concepts and limitations in visual thinking. To

improve this ability, a visual representation-based learning approach, such as diagrams, simulations, and interactive models, can be applied to strengthen students' understanding in explaining physics concepts.

4. Conclusion

From the results of the discussion, it can be seen that project-based learning is in demand and needed by students to provide a more meaningful and contextual learning experience. Likewise, students' creative thinking skills and learning independence are not yet optimal. For this reason, it is necessary to design a learning model based on Project Base Learning which is expected to improve students' creative thinking skills and learning independence.

References

Almulla, M. A. (2020). The Effectiveness of the Project-Based Learning (PBL) Approach as a Way to Engage Students in Learning. *SAGE Open*, *10*(3). https://doi.org/10.1177/2158244020938702

Amaliyah, F., Supeno, S., & Wahyuni, S. (2023). The Profile of Junior High School Students' Creative Thinking Skills about Alternative Energy in Science Learning. *Unnes Science Education Journal*, *12*(1), 18–23. https://doi.org/10.15294/usej.v12i1.65085

Ambiyar, A., Aziz, I., & Melisa, M. (2020). Perbedaan Kemandirian Belajar Siswa Pada Masa Pandemi di SMAN 1 Lembah Melintang dan SMAN 1 Lembah Gumanti. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(2), 1246–1258. https://doi.org/10.31004/cendekia.v4i2.367

Ameliana, I. (2017). Teacher-Centered or Student-Centered Learning Approach To Promote Learning? *Jurnal Sosial Humaniora*, *10*(2), 59. https://doi.org/10.12962/j24433527.v10i2.2161

Anazifa, R. D., & Djukri. (2017). Project- based learning and problem- based learning: Are they effective to improve student's thinking skills? *Jurnal Pendidikan IPA Indonesia*, *6*(2), 346–355. https://doi.org/10.15294/jpii.v6i2.11100

Andajani, K. (2022). Modul Pembelajaran Berdiferensiasi. *Mata Kuliah Inti Seminar Pendidikan Profesi Guru*, *2*.

Andika Febrian, Y Yennita, Z. M. (2021). *The Need Analysis for E-Learning Based on Massive Open Online Course (MOOC) for High School Students*. Jurnal Penelitian Pendidikan IPA.

Andriyani, J. (2020). Peran Lingkungan Keluarga Dalam Mengatasi Kenakalan Remaja. *At-Taujih : Bimbingan Dan Konseling Islam*, *3*(1), 86. https://doi.org/10.22373/taujih.v3i1.7235

Anggianita, S., Yusnira, Y., & Rizal, M. S. (2020). Persepsi Guru terhadap Pembelajaran Daring di Sekolah Dasar Negeri 013 Kumantan. *Journal of Education Research*, *1*(2), 177–182. https://doi.org/10.37985/joe.v1i2.18

Arlina Arlina, Nova Emiliya Pane, Wildan Sitorus, Mardiah Putri Jerohmi, & Azra Munazah. (2023). Strategi Project Based Learning Sebagai Alternatif

Menciptakan Siswa Kreatif. *SOKO GURU: Jurnal Ilmu Pendidikan*, *3*(2), 117–126. https://doi.org/10.55606/sokoguru.v3i2.2191

Artama, K. K. J., Budasi, I. G., & Ratminingsih, N. M. (2023). Promoting the 21st Century Skills Using Project-Based Learning. *Language Circle: Journal of Language and Literature*, *17*(2), 325–332. https://doi.org/10.15294/lc.v17i2.39096

Astika. (2013). Pengaruh model pembelajaran berbasis masalah (problem based learning) terhadap sikap ilmiah dan ketrampilan berpikir ritis. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, *Vol 3*(1), 1–10.

B. Molina, N., Djawa Djong, K., Beda Nuba Dosinaeng, W., & Ovaritus Jagom, Y. (2021). Kemampuan Berpikir Kreatif Siswa Dalam Menyelesaikan Soal Open Ended. *Asimtot : Jurnal Kependidikan Matematika*, *3*(2), 187–199. https://doi.org/10.30822/asimtot.v3i2.1374

Bell, R. (2020). Adapting to constructivist approaches to entrepreneurship education in the Chinese classroom. *Studies in Higher Education*, *45*(8), 1694–1710. https://doi.org/10.1080/03075079.2019.1655724

Belwal, R., Belwal, S., Sufian, A. B., & Al Badi, A. (2020). Project-based learning (PBL): outcomes of students' engagement in an external consultancy project in Oman. *Education and Training*, *63*(3), 336–359. https://doi.org/10.1108/ET-01-2020-0006

Dewi, D. M., Supriyo, & Suharso. (2013). Kepercayaan Diri Ditinjau Dari Pola Asuh Orang Tua Pada Siswa Kelas VII (Studi Kasus). *Indonesian Journal of Guidance and Counseling: Theory and Application*, *2*(4), 9–16. http://journal.unnes.ac.id/sju/index.php/jbk

Dewi, P. Y. A., & Primayana, K. H. (2019). Effect of Learning Module with Setting Contextual Teaching and Learning to Increase the Understanding of Concepts. *International Journal of Education and Learning*, *1*(1), 19–26. https://doi.org/10.31763/ijele.v1i1.26

Diyah, P., NURHAJATI, D., & SUSANTI, Y. (2023). the Implementation of Project Based Learning in Introduction To Literature Subject To the English Education Department …. *Jurnal Koulutus: Jurnal Pendidikan Kahuripan*, *6*(1), 1–12. http://repository.unpkediri.ac.id/9186/%0Ahttp://repository.unpkediri.ac.id/9186/19/RAMA_88203_18101080012_0711126302_0718017801_01_front_ref.pdf

Emira Hayatina Ramadhan, & Hindun Hindun. (2023). Penerapan Model Pembelajaran Berbasis Proyek untuk Membantu Siswa Berpikir Kreatif. *Protasis: Jurnal Bahasa, Sastra, Budaya, Dan Pengajarannya*, *2*(2), 43–54. https://doi.org/10.55606/protasis.v2i2.98

Fadhil, M., Kasli, E., Halim, A., Evendi, Mursal, & Yusrizal. (2021). Impact of Project Based Learning on Creative Thinking Skills and Student Learning Outcomes. *Journal of Physics: Conference Series*, *1940*(1). https://doi.org/10.1088/1742-6596/1940/1/012114

Gall, M. D., Gall, J. P., & Borg, W. R. (2019). *Educational Research: An Introduction (10th ed.)*. Pearson.

Hairunisa, N. (2023). Pembelajaran Berbasis Student-Centered Learning Pada Materi Pendidikan Agama Islam Siswa Kelas Viii Madrasah Tsanawiyah Darul Falah Sumber Agung Kecamatan Bengkunat Kabupaten Pesisir

Barat. *Unisan Journal: Jurnal Manageman Dan Pendidikan*, *2*(07), 448–458. https://journal.an-nur.ac.id/index.php/unisanjournal

Harahap, J. Y. (2017). Hubungan Antara Kontrol Diri Dengan Ketergantungan Internet Di Pustaka Digital Perpustakaan Daerah Medan. *Jurnal Edukasi*, *3*(2), 131–145.

Issa, H. B., & Khataibeh, A. (2021). The Effect of Using Project Based Learning on Improving the Critical Thinking among Upper Basic Students from Teachers' Perspectives. *Pegem Egitim ve Ogretim Dergisi*, *11*(2), 52–57. https://doi.org/10.14527/pegegog.2021.00

Karan, E., & Brown, L. (2022). Enhancing Student's Problem-solving Skills through Project-based Learning. *Journal of Problem Based Learning in Higher Education*, *10*(1), 74–87. https://doi.org/10.54337/ojs.jpblhe.v10i1.6887

Kasi, R. (2022). Pembelajaran Aktif : Mendorong Partisipasi Siswa. *Jurnal Pembelajaran*, *1*(1), 1–12.

Kresna, K. A. Y., & Rahmasari, I. (2020). Kepercayaan Diri Ditinjau Dari Dukungan Sosial Pada Siswa Tunarungu. *Profesi (Profesional Islam) : Media Publikasi Penelitian*, *18*(1), 1–7. https://doi.org/10.26576/profesi.v18i1.31

Lee, D., Huh, Y., & Reigeluth, C. M. (2015). Collaboration, intragroup conflict, and social skills in project-based learning. *Instructional Science*, *43*(5), 561–590. https://doi.org/10.1007/s11251-015-9348-7

Mahombar, A., Padang, H. P., & Hutagalung, P. (2023). Dampak Penerapan Model Pjbl Dengan STEM Pada Kemampuan Berpikir Kreatif dan Berpikir Kritis Siswa. *PASCAL (Journal of Physics and Science Learning)*, *7*(2), 49–57. https://doi.org/10.30743/pascal.v7i2.8172

Maysuri, T., & Sopacua, J. (2024). *Pengaruh Penerapan Model Pembelajaran Project Based Learning dalam Upaya Meningkatkan Hasil Belajar pada SMA Negeri 3 Maluku Tengah*. 566–580.

Miterianifa, M., Ashadi, A., Saputro, S., & Suciati, S. (2021). *Higher Order Thinking Skills in the 21st Century: Critical Thinking*. *January*. https://doi.org/10.4108/eai.30-11-2020.2303766

Mohamad et al. (2020). *Analisis Peran Budaya Organisasi Dalam Meningkatkan Kinerja Pegawai Di Kantor Desa Tagog Apu*. *XXI*(2), 113–123.

Morrison-Smith, S., & Ruiz, J. (2020). Challenges and barriers in virtual teams: a literature review. In *SN Applied Sciences* (Vol. 2, Issue 6). Springer International Publishing. https://doi.org/10.1007/s42452-020-2801-5

Morrison, J., Frost, J., Gotch, C., McDuffie, A. R., Austin, B., & French, B. (2021). Teachers' Role in Students' Learning at a Project-Based STEM High School: Implications for Teacher Education. *International Journal of Science and Mathematics Education*, *19*(6), 1103–1123. https://doi.org/10.1007/s10763-020-10108-3

Musdi, E., As'ari, A. R., Harisman, Y., Syaputra, H., & Hevardani, K. A. (2024). Student's creative thinking based on study level, learning style, gender, and combination of the three. *International Journal of Evaluation and Research in Education* , *13*(3), 1591–1601. https://doi.org/10.11591/ijere.v13i3.27936

Nugraha, I. R. R., Supriadi, U., & Firmansyah, M. I. (2023). Efektivitas Strategi

Pembelajran Project Based Learning dalam meningkatkan Kreativitas Siswa. *Jurnal Penelitian Dan Pendidikan IPS*, *17*(1), 39–47. http://ejournal.unikama.ac.id/index.php/JPPI

Purwasila, G. E. ., Pujani, N. ., & Sujanem, R. (2024). Model Pembelajaran Flipped Clasroom Berbasis STEM Meningkatkan Keterampilan Berfikir Kritis dan Hasil Belajar IPA Siswa. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, *14*(1), 39–51. https://ejournal.undiksha.ac.id/index.php/JPPII/article/view/75279/28608

Purwati, S., & Alberida, H. (2022). Profile of Students' Creative Thinking Skills in High School. *Thinking Skills and Creativity Journal*, *5*(1), 22–27. https://doi.org/10.23887/tscj.v5i1.45432

Puspitasari, L., In'am, A., & Syaifuddin, M. (2018). Analysis of Students' Creative Thinking in Solving Arithmetic Problems. *International Electronic Journal of Mathematics Education*, *14*(1), 49–60. https://doi.org/10.12973/iejme/3962

Rahim, T. N. (2018). Hubungan Kemandirian dengan Berpikir Kritis pada Mahasiswa. *Journal of Comprehensive Science*, *4*(1), 449–460.

Rahman, M. (2015). English for Specific Purposes (ESP): A Holistic Review. *Universal Journal of Educational Research*, *3*(1), 24–31. https://doi.org/10.13189/ujer.2015.030104

Rani, H. (2021). Penerapan Metode Project Based Learning pada Pembelajaran Sejarah Kebudayaan Islam dalam Meningkatkan Motivasi Belajar. *Jurnal Pendidikan Refleksi*, *10*(2), 8. https://p3i.my.id/index.php/refleksi/article/view/40

Ritonga, D., & Napitupulu, S. (2024). Implementasi Metode Pembelajaran Aktif dalam Meningkatkan Keterampilan Berpikir Kritis Siswa Sekolah Dasar. *Education & Learning*, *4*(1), 38–45. https://doi.org/10.57251/el.v4i1.1292

Rofiqa Duri, Jumi Adela Wardiansyah, Debi Agustin, N. U. (2024). Perbedaan Kontrol Diri Mahasiswa Dakwah Dan Komunikasi UIN Ar-Raniry Banda Aceh. *Syifaul Qulub: Jurnal Bimbingan Dan Konseling Islam*, *05*(2), 83–93.

Rofiudin, A., Prasetya, L. A., & Prasetya, D. D. (2024). Pembelajaran Kolaboratif di SMK : Peran Kerja Sama Siswa dalam Meningkatkan Keterampilan Soft skills. *Journal of Education Rese*, *5*(4), 4444–4455.

Salay, R. (2019). Perbedaan Motivasi Belajar Siswa yang Mendapatkan Teacher Centered Learning (TCL) Dengan Student Centered Learning (SCL). *Education*, *1*(1), 1–12.

Sani Susanti, Fitrah Aminah, Intan Mumtazah Assa'idah, Mey Wati Aulia, T. A. (2024). Dampak Negatif Metode Pengajaran Monoton Terhadap Motivasi Belajar Siswa Sani. *Pedagogik*, *2*(2), 86–93.

Santyasa, I. W., Rapi, N. K., & Sara, I. W. W. (2020). Project based learning and academic procrastination of students in learning physics. *International Journal of Instruction*, *13*(1), 489–508. https://doi.org/10.29333/iji.2020.13132a

Septianingsih, D., Burhanudin, M. Z., Fawzia, M., Irawati, H., & Wahyuni, P. A. (2024). Implementasi Metode Pembelajaran Project Based Learning Berbasis Teknologi Canva Untuk Meningkatkan Kreativitas Peserta Didik di SMA N 1 Tambun Selatan. *SSRN Electronic Journal*.

https://doi.org/10.2139/ssrn.4837650

Setyo, A., Elmunsyah, H., & Prasetiyanto, A. E. (2024). Pembelajaran Berbasis Proyek Di Media Sosial: Strategi Peningkatan Motivasi Dan Semangat Belajar Siswa Sekolah Kejuruan. *Research and Development Journal of Education*, *10*(1), 471. https://doi.org/10.30998/rdje.v10i1.23341

Situmorang, M., Sinaga, M., Sitorus, M., & Sudrajat, A. (2022). Implementation of Project-based Learning Innovation to Develop Students' Critical Thinking Skills as a Strategy to Achieve Analytical Chemistry Competencies. *Indian Journal of Pharmaceutical Education and Research*, *56*(1), S41–S51. https://doi.org/10.5530/ijper.56.1s.41

Sucipta, I. W., Candiasa, I. M., & Sudirtha, I. G. (2023). Pengaruh Model Pembelajaran Berbasis Masalah Ditinjau dari Gaya Kognitif Program Studi Penelitian dan Evaluasi Pendidikan. *Jurnal Penelitian Dan Evaluasi Pendidikan Indonesia*, *13*(1), 168–178.

Sulistyo, D. M. (2021). Peningkatan Kreativitas Dan Prestasi Belajar Matematika Konsep Pola Bilangan Melalui Pemberian Tugas Mandiri Pada Siswa. *Jurnal VARIDIKA*, *33*(1), 63–70. https://doi.org/10.23917/varidika.v33i1.15233

Sumarni, W., & Kadarwati, S. (2020). Ethno-stem project-based learning: Its impact to critical and creative thinking skills. *Jurnal Pendidikan IPA Indonesia*, *9*(1), 11–21. https://doi.org/10.15294/jpii.v9i1.21754

Susanti, D. A. (2020). Bimbingan Orang Tua Dalam Mengembangkan Perilaku Kemandirian Anak Usia Dini. *AL IBTIDA' : Jurnal Program Studi Pendidikan Guru Madrasah Ibtidaiyah*, *8*(1), 35–56. http://ejournal.kopertais4.or.id/mataraman/index.php/alibtida/article/view/4464

Trianasari, E., Sudrajat, didi, Subroto, Purnama, Y., Tumiwa, J., Liria, T., & Hutauruk. (2024). Pengaruh metode pembelajaran berbasis proyek pada kemampuan berbicara bahasa inggris siswa. *Jurnal Review Pendidikan Dan Pengajaran*, *7*(3), 10081–10088.

Tsvetkova, M., Saenko, N., Levina, V., Kondratenko, L., & Khimmataliev, D. (2021). Organizing students' independent work at universities for professional competencies formation and personality development. *International Journal of Instruction*, *14*(4), 503–528. https://doi.org/10.29333/iji.2021.14430a

Wu, T. T., & Wu, Y. T. (2020). Applying project-based learning and SCAMPER teaching strategies in engineering education to explore the influence of creativity on cognition, personal motivation, and personality traits. *Thinking Skills and Creativity*, *35*(May 2019), 100631. https://doi.org/10.1016/j.tsc.2020.100631

Wulandari, R. P., & Sunarti, V. (2024). *Hubungan Pemberian Reward Oleh Orang Tua Dengan Kedisiplinan Anak Usia Dini 5-6 Tahun Di Desa Taluk Kecamatan Pariaman Selatan*. *4*, 714–722.

Yuniarti, Y. (2021). Project Based Learning sebagai Model Pembelajaran Teks Anekdot Pada Siswa SMA. *Jurnal Pendidikan Bahasa Indonesia*, *9*(2), 73. https://doi.org/10.30659/jpbi.9.2.73-81

Yustina, Syafii, W., & Vebrianto, R. (2020). The effects of blended learning and project-based learning on pre-service biology teachers' creative thinking

skills through online learning in the COVID-19 pandemic. *Jurnal Pendidikan IPA Indonesia*, *9*(3), 408–420. https://doi.org/10.15294/jpii.v9i3.24706

Zainuddin, A., Harahap, P., & Naldi, W. (2023). Motivasi Guru Menulis Karya Ilmiah; Faktor Penyebab dan Solusi (Studi Kasus Pada Guru Pai Di Sekolah Menengah Atas Negeri Rejang Lebong -Bengkulu). *Edukasi Islami: Jurnal Pendidikan Islam*, *12*(01), 601–614. https://doi.org/10.30868/ei.v12i01.3839

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